

Streaming TV via the Internet - Quick Setup and Free!

This wouldn't be the first time that we reported in TELE-satellite on streaming solutions that would let you receive TV and radio content via the Internet. In this way you could be on vacation in your hotel on the other side of the world and playback your favorite programs from your living room via an Internet stream or simply watch your favorite TV channels while on vacation.

In this issue of TELE-satellite we are once again introducing a solution that requires nothing more than a PC that most users already have anyway. For our report we used an Intel Core2Duo PC, not really used anymore today but perfect for our purposes. Microsoft Windows was already installed.

But wait! We forgot to mention one little thing: To be able to process the video signal and transmit it via the Internet, our PC would have to be always turned on and connected to the Internet. In the end we wouldn't really know when we would need access to this PC and keeping this PC running 24/7 would have quite an ugly affect on our next electric bill. Since efficiency is the name of our game, we need a different solution.

WOL - Wake On LAN

Thankfully, the two US companies AMD and Hewlett Packard decided to agree on the WOL (Wake on LAN) standard back in 1995 with which PCs can be turned on through a network connection. Since this standard has found numerous uses, nearly every modern PC or Mac is outfitted with this feature.

The necessary settings, however, are typically buried deep within the BIOS.



■ A Host name is selected using the free dyndns.org service

How WOL works is quickly explained: First you have to understand that every network card, every WLAN stick, every router, in other words, any device that in some way can be connected to a network operates using a so-called MAC (Media Access Control) address. This MAC address is a 48-bit hexadecimal character string that uniquely identifies each individual network device.

For the WOL feature this address is especially important since we really only want to remotely turn on one particular PC and not, for example, the PC in the work room or the Playstation in the living room. To turn on only one PC, you would need both its IP address and its MAC address.

Finding the MAC address is relatively easy using the command "ipconfig/all". The IP address on the other hand is a little more difficult to figure out.

A Host Address from One IP Address

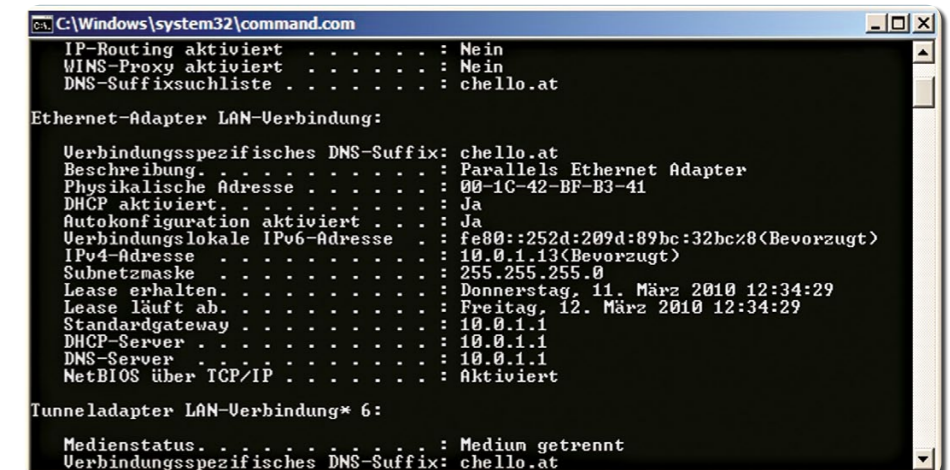
If you happen to have a dedicated Internet connection, you merely have to identify the IP address in use to get things going. If, like most users, your Internet provider gives you a dynamic IP address, it doesn't help to know the IP address since it will change the next time the Internet is accessed.

Fortunately, there are free services, such as www.dyndns.org, that can tackle this problem. It's a small tool that operates in the background and monitors the current IP address. It sends this information to the dyndns.org server where it is combined with a fixed host

address. This host address is set only once and could, for example, be tele-satellite.dyndns.org.

Once everything is correctly set up, you can use this address from any Internet access point around the world to connect to those IP addresses that are linked with your Internet access at home. Here's a little tip for you: if you connect to the Internet using a router or a DSL modem, you should check to see if the dyndns.org service isn't already directly supported. In such a case, the necessary data would be forwarded by the modem to the provider; maybe you don't even need that little Windows tool. This is the case with most routers and DSL modems.

If you know the IP address and the MAC address of your PC at home, the WOL inquiry can be sent via the Internet. It consists of the hexadecimal value FF six times followed by the MAC address of the desired PC. If the PC at home receives this data and if the MAC address is correct, the PC is turned on



■ The MAC address can easily be found using Windows built-in resources

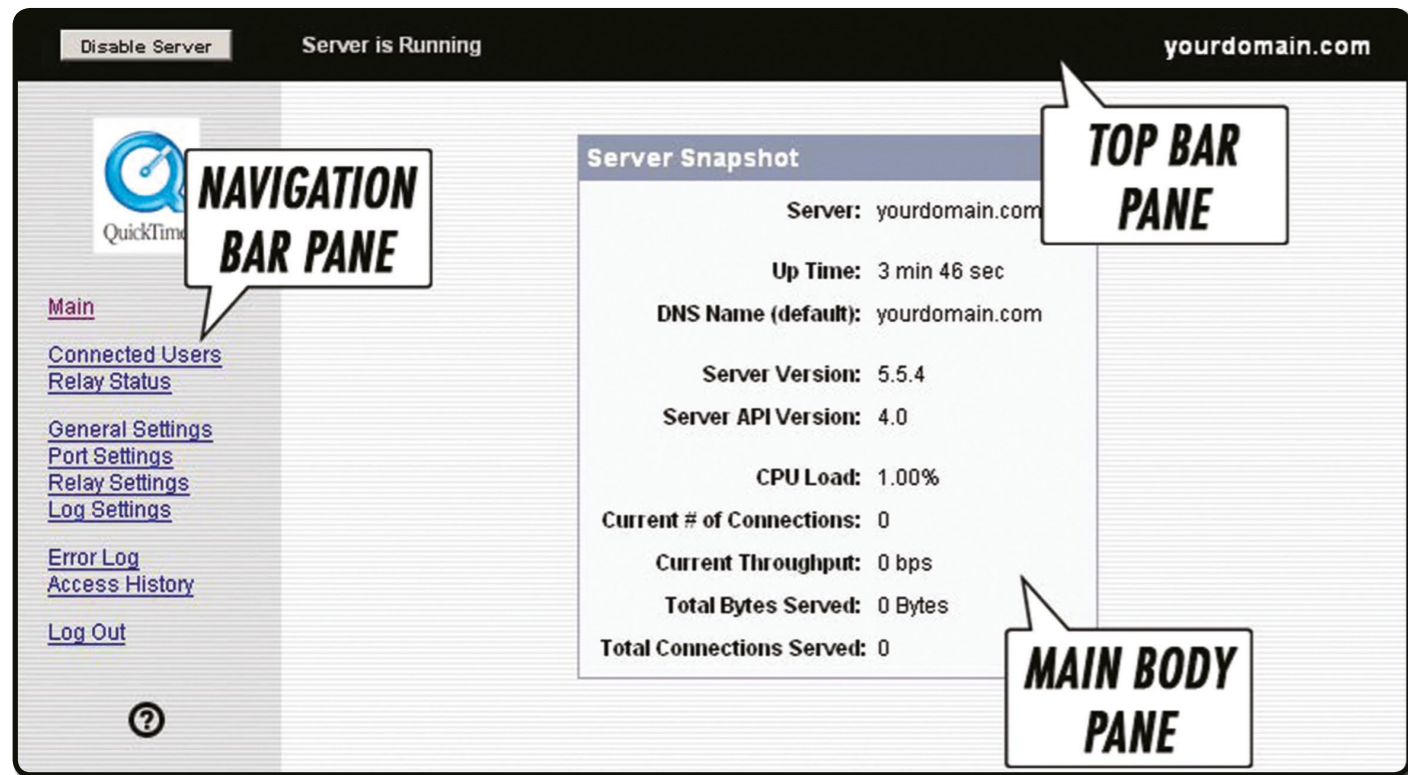
via the ACPI (Advanced Configuration and Power Interface). It is the central interface for turning your PC on/off and for power saving.

Now you need to be able to get past the Login screen. For Windows XP, Microsoft with its XP Powertoy offers a tiny TweakUI program (<http://www.microsoft.com/windowsxp/downloads/powertoy/XPpowertoy.msp>) that will automatically logon for you. For Windows Vista and Windows 7, Microsoft has already integrated this capability in its operating system. If, for security reasons, you can't use automatic logon, you can configure RealVNC such that it will start before the Login screen appears so that you can login remotely just as you would if you were sitting in front of your PC at home.

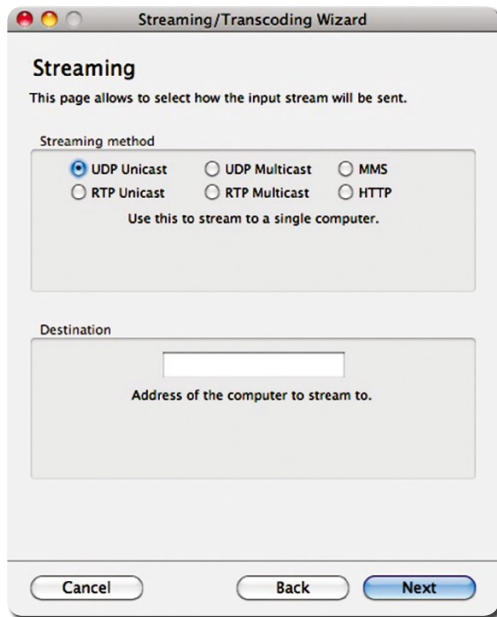
Capture Card

Thanks to WOL, the first hurdle has been jumped letting you remotely start your PC at home. The next step involves figuring out how the audio and video data will get from the receiver to your PC. This can be done with an inexpensive video capture card available from a PC shop starting at around 25€.

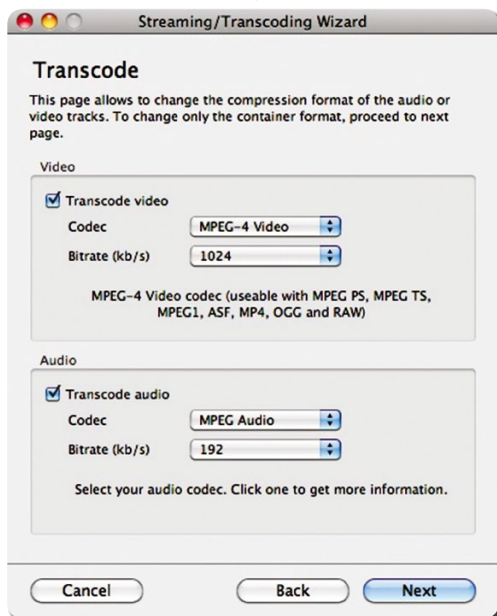
Installing and connecting the card should typically not be a problem; every well-known manufacturer provides the necessary drivers and setup tools that should make installation a snap. Most capture cards come with not only an analog or even digital terrestrial tuner, but also provide CVBS and S-Video jacks. The S-Video jack can be used but it isn't necessary since although it does deliver a better video signal, compared



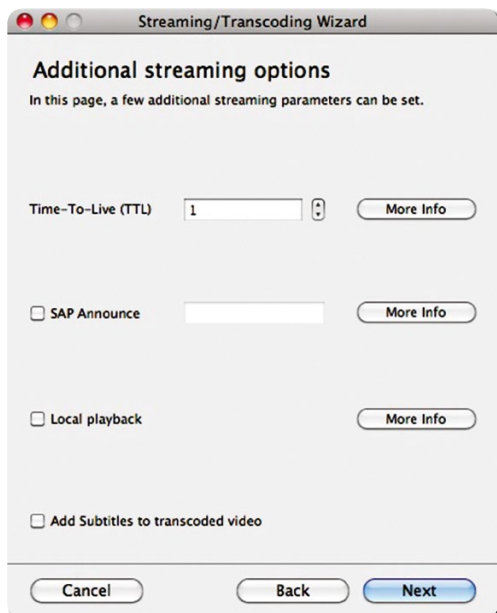
■ Darwin Streaming Server Interface



■ Multiple streaming protocols are available in the VLC Player



■ Even the compression is user selectable



■ Some additional streaming parameters

to CVBS you can't really tell the difference when transmitted via the Internet.

Choosing the Right Receiver

Thanks to the capture card, we can view audio/video signals from an external receiver on a PC but at the moment it's not possible to control the receiver via the Internet. When selecting the set-top box to be used, you should choose a model that comes with an integrated web server that will at a minimum let you control the basic functions of the box through an Internet browser. Such a receiver could, for example, be the AzBox Premium HD Plus that we just recently introduced in TELE-satellite issue 04-05/2010.

Ports

Our test PC is just about ready to go; the only thing missing is the necessary software to compress and process the audio/video data. And let's not forget this: if your PC is not directly connected to the Internet and instead connects using a router or DSL modem, these devices also typically function as a firewall and block all incoming connections including the WOL packet as well as the access to the receiver's web interface and the ports with the streaming audio/video content.

Before we use the necessary software to process the audio/video content, we first have to properly set up the router.

For that we want to set up pass-through of the corresponding ports for the WOL signal, for streaming, for receiver control and for the remote access of our PC. All incoming data from the Internet will now be forwarded by the router or DSL modem directly to the PC. The ports are freely selectable so you should make sure that there are no conflicts with ports that are already in use. For that reason ports between 4000 and 4100 can be used.

The Matching Software

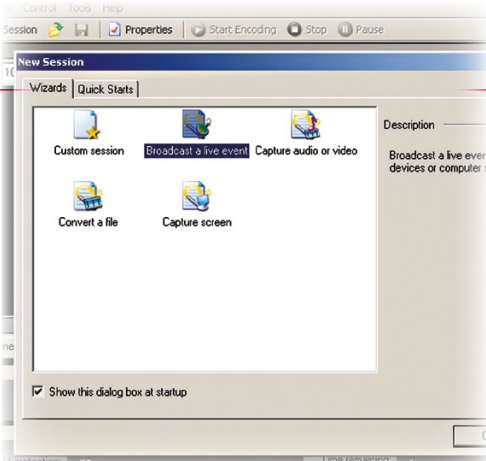
If you search for "video streaming" using one of the larger Internet software portals, you'll be bombarded with hundreds of entries with corresponding software. But, thanks to Microsoft, it will also work with their Windows Media Encoder. If for some reason it isn't already installed on your PC, you can download it from Microsoft's website <http://download.microsoft.com>.

Once started, you simply identify the desired A/V source (in our case the video capture card), enter the selected router port and select the operating bandwidth. This of course would depend on your Internet upload speed which in most cases is slower than your download speed. You can start off small by selecting 50 or 100 kb/s. You can always increase this value at a later time if your Internet connection can support it.

Once all the settings are correct,



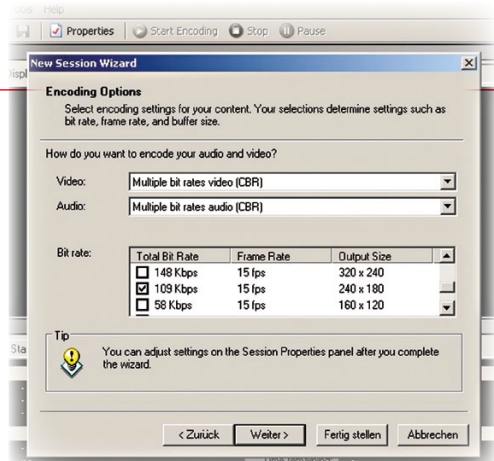
■ The VLC Player streams live and also receives



■ The Windows Media Encoder main window

they are saved in a configuration file so that it can be recalled for the Windows Media Encoder at a later time.

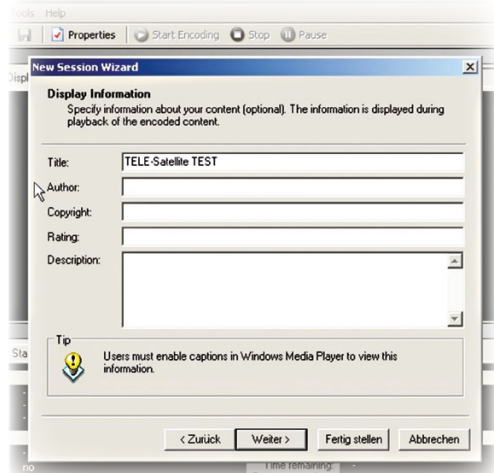
In our test the preparation and initialization of the A/V stream functioned perfectly with the help of the video capture card. Even during an active transmission, the load on our test PC was not enough to prevent us from performing other operations on the PC quickly and at the same time.



■ The compression bitrate

On the reception side of things, the widely used Windows Media Player, a basic feature included with every MS Windows installation, can be used for reception. The stream is accessed via the menu item "Open URL" using an address such as "tele-satellite.dyndns.org:4001" where "tele-satellite.dyndns.org" is the host address and 4001 represents the streaming port.

Now we can not only watch A/V content on any PC anywhere in the world, but it's also possible through the receiver's web interface to control the receiver and turn on your PC remotely using WOL. This can be done either by sending the WOL signal via a command line request to your PC at home or by doing it through the website <http://www.dslreports.com/wakeup>.

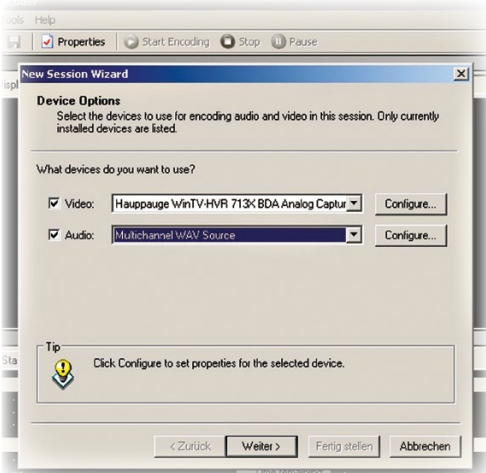


■ The stream is clearly identified

problems with the streaming software and how do you turn off the PC remotely?

A number of Remote Access Tools are available to handle this. These would have to be installed on the PC at home as well as on a portable receiver (such

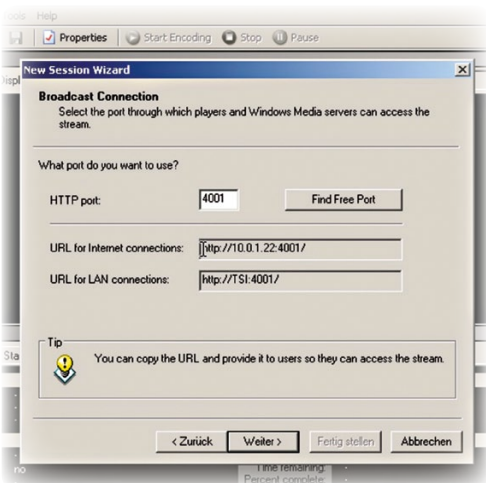
This leaves us with only one unresolved scenario: how do you handle



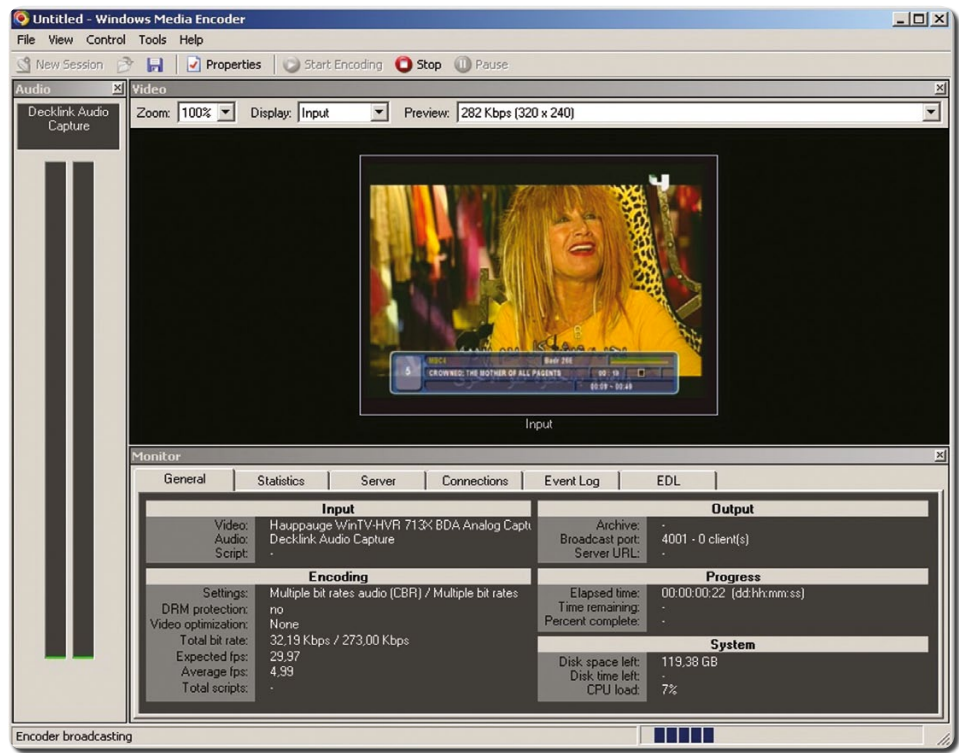
■ We used a Hauppauge video capture card for our tests



■ Either a direct connection is created or the stream is sent to a server



■ The desired port is user selectable



■ It's ready to go!

as a laptop) and would allow you to view on your laptop the desktop, keyboard and mouse entries of your PC at home via the Internet. In this way you could, for example, be in a hotel room in Thailand and control all of the functions of your PC at home as if you were sitting in your living room right in front of it. This will let you not only correct any problems that might pop up with the streaming software but with just a few mouse clicks you can also put your PC at home in standby mode or shut it down completely. The software to do this could be, for example, RealVNC <http://www.realvnc.com> or LogMeIn <http://www.logmein.com>. Please note that a corresponding port in your router or DSL modem configuration must be opened. More information on which port or ports should be opened can be found in the user manual of the software you use.

Why Not Use the Streaming Function of a Digital Receiver?

Most modern PVR receivers come with not only the ability to remotely operate it using the web interface, but they also offer direct A/V streaming. It sounds like this would be a much better solution than using a PC and video capture card, don't you think? Well, our response to that is this: in a PC the compression of the video signal can be set to your requirements and above all should be based on the speed of your Internet connection. This isn't possible with the receivers integrated streaming solution and could lead to significant problems with a slow Internet connection. While the bandwidth can simply be reduced in the PC solution resulting in lower resolution and higher compression, you'd still receive an uninterrupted signal; digital receivers stream with a fixed bandwidth that might not be easy to transmit via a typical DSL connection that isn't all too fast to begin with. This is especially true if it involves high-resolution content.

Playing Back Videos on a Hard Drive

In addition to the ability to playback audio/video from external devices, wouldn't it be nice to also be able to stream video clips stored on a receiver's hard drive via the Internet? The Windows Media Encoder is not really meant

for that purpose; The VideoLan Project of the engineering school École Central Paris has exactly what you need to solve this problem. Some of you probably are already familiar with the VLC Player; it can play back all of the well-known audio/video formats on your PC. But it's this same video player that comes integrated with a streaming server that can easily be activated and then, similar to the Windows Media Encoder, can transmit all of your desired content via the Internet. Setting it up is a piece of cake; it's almost impossible to do anything wrong. You can download the VLC Player for free from www.videolan.org and it's compatible with numerous operating systems (Windows, Mac and Linux to name a few).

Mac

What about video streaming using a Mac computer? Not a problem. If you use the Mac OSX Server, you already have the Quicktime Streaming Server installed and it can be used in much the same way as the Windows Media Encoder. If you're only using the workstation version of Mac OSX, don't worry, the Darwin Streaming Server is an excellent open source software alternative that can be downloaded from

<http://dss.macosforge.org>. Even here it's possible in both cases to easily generate a stream that can then via RTP Protocol be compressed using various techniques (for example MPEG-4). Using the detailed documentation, all of the required settings are quickly taken care of thus making the system ready to use in just a very short time.

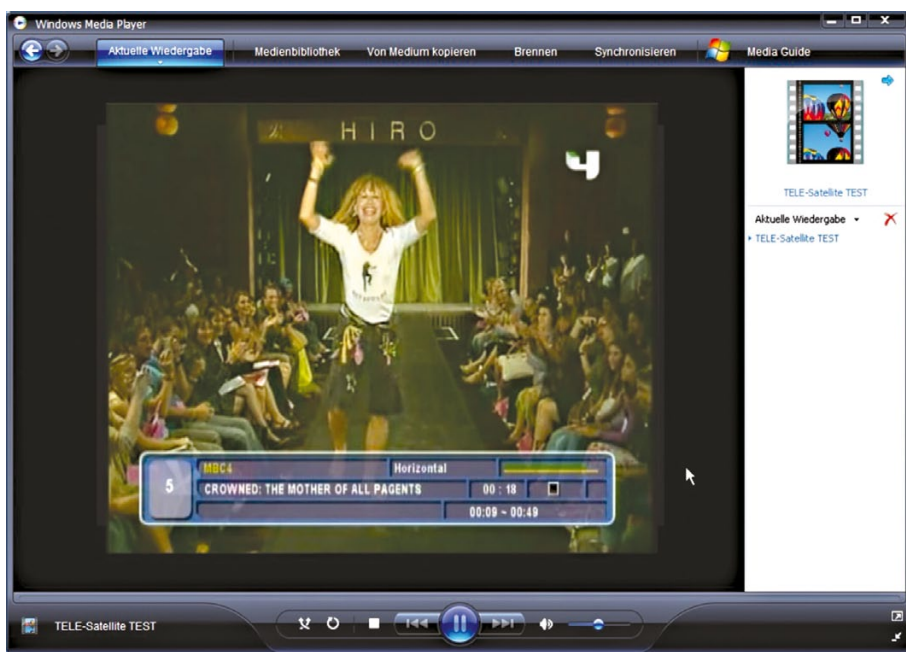
Conclusion

It doesn't matter if it's Windows or Mac, the transmission of A/V streams via the Internet has for the most part become part of our everyday lives thanks to highly efficient and readily available Internet access. Older PCs can be converted to a streaming server with just a few mouse clicks and you won't have to shell out a single dime for any new software. You only need to get a video capture card if you don't already have one.

One final note regarding security: every open port with a direct link to your PC poses a security risk. If possible, set up password protection and choose a secure password. If the streaming service won't be used for a period of time, it might be a good idea to close the port in your firewall configuration.

Software to Stream Via PC or Mac

Windows Media Encoder - <http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=5691ba02-e496-465a-bba9-b2f1182cdf24>
RealVNC - <http://www.realvnc.com>
LogMein - <http://www.logmein.com>
VLC Player - <http://www.videolan.org>
Darwin Streaming Server - <http://dss.macosforge.org>



■ The stream is received using the Windows Media Player